INSTITUTE OF PUBLIC HEALTH

COLLEGE OF MEDICINE AND HEALTH SCIENCES

UNIVERSITY OF GONDAR

KNOWLEDGE ON OCCUPATIONAL HAZARDS AND UTILIZATION OF PERSONAL PROTECTIVE EQUIPMENT AMONG WELDERS OF GONDAR CITY, NORTH WEST ETHIOPIA.

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INSTITUTE OF PUPLIC HEALTH

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ASSESSMENT OF THE KNOWLEDGE OF OCCUATIONAL HAZARDS AND UTILIZATION OF PERSONAL PROTECTIVE EQUIPMENTS AMONG GONDAR CITY WELDERS, NORTH GONDAR ZONE, AMHARA REGIONAL STATE, NORTH WEST ETHIOPIA.

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ACRONYMS

BSc	Bachelor of Science
CI	Confidence Interval
ICT	Information Communication Technology
IR	Infrared Radiation
MPH	Master of Public Health
OR	Odds Ratio
PPE	Personal Protective Equipment
SPSS	Stastical Software for Social Sciences
UV	Ultraviolet Radiation
WHO	World Health Organization

ABSTRACT

Introduction: The medical and safety problems associated with welding include skin burns, fume inhalation, electric shock, overheating, injuries resulting from explosion of fire, actinic keratitis (welder's flash), ocular foreign bodies, and death. In Ethiopia industries are growing up, on the contrary studies regarding knowledge of occupational hazards and utilization of protective devices are limited.

Objective: To assess the level of knowledge on occupational hazards and Utilization of personal protective equipment among welders of Gondar city.

Methodology: Cross sectional study was conducted from April 15 to 30, 2012 among Gondar city welders. The study included 390 workers selected by simple random sampling. A structured and pretested questionnaire and observational checklist were used for data collection. The data were entered, EPI INFO 2002 and analyzed using SPSS version 16 statistical package. Frequencies and summary statistics were used to describe the study population. Binary and multiple Logistic regression analysis were carried out.

Result: two hundred fifty eight (66.2%) respondents were knowledgeable of occupational hazards and 159 (40.8%) welders self reported utilization of PPEs compared to 67(17.2%) by checklist. Safety training [AOR: 2.84, 95% CI: 1.30, 6.21] and supervision [AOR: 2.77, 95% CI: 1.52, 5.06] were main factors to increase knowledge on occupational hazards among welders. Safety training [AOR: 2.29, 95% CI: 2.28, 4.11] and availability of PPE in the organization [AOR: 2.65, 95% CI: 1.38, 5.09] were main factors to increase utilization of PPE among the welders.

Conclusion and recommendation: the knowledge on occupational hazards was good, the utilization of PPEs was poor among the welders. Safety training was the common factor to increase knowledge on occupational hazards and utilization of PPE and training of the welders should be encouraged.

Key words: welders, Gondar, knowledge, utilization, occupational hazards, personal protective equipment

1. INTRODUCTION

1.1. Statement of the problem

The World Health Organization (WHO) considers the workplace a priority setting for health promotion in the 21st century. Like other settings where WHO has developed health-promoting initiatives (schools, cities, hospitals, industries), the workplace can have a very positive impact on the health and well-being of workers, their families, communities and society at large(1).

Safe work and workplace, for increased production and higher productivity, is necessary and hence promotion and protection of safe work and workplace is the complementary aspect of industrial development (2, 3). However, Industrial occupations may create unsafe work and work environment because of the inherent sources of hazard present in their material, process, technologies or products. These sources of hazards may pose the risk of accidents and work related disease to the people within the industrial premises in particular and the general public in the vicinity and the environment in general (4).

Welding is the process in which metal or other thermoplastic materials are joined together by the application of heat or pressure, or both with or without the use of filler metal. Electric welding was introduced in about 1940 and manual metal arc welding has become the predominant method. Uncoated and acidic coated electrodes were used up to the early 1950s. These electrodes produced an abundance of fumes. By the mid 1950s basic coated electrodes were mainly used. In the 1970s gas shielded welding and tungsten inert gas welding were introduced. Welding on aluminum and on zinc primed steel occasionally took place before 1970. Until 1976 welding was performed mainly on mild steel. From 1977 onwards stainless steel was gradually introduced and by 1990 about 50% of the welding arc time was carried out on stainless steel (5).

At present, it is estimated that more than one million workers are employed as welders worldwide with more than three million performing welding intermittently as part of their work duties. One of the jobs that contribute to these occupational injuries is non-

industrial welding, especially in developing countries including Ethiopia. Welders cut and join metal parts using flame, electric arc or other sources of heat. There are three main classes of welding, namely, arc, oxyacetylene fuel and robotic welding. Some of the hazards of this occupation include ultraviolet (UV) and infrared radiation (IR) exposure, fumes and particulate generation, thermal burns, occupational heat stress, exposure to electromagnetic fields, and electrocution(6).

Similarly, the excessive lighting (glare) and exposure to UV radiation may lead to ‘arc eye’ or ‘flash burn’ injuries to the cornea, photokeratosis and double vision and consequent retinal damage (6). Welders are also exposed to noxious metal fumes containing a cocktail of metals like zinc, copper, cobalt, nickel, chromium, platinum, and their oxides leading to various respiratory dysfunctions and influenza-like condition called metal fume fever(7).

Welders are often exposed to potential workplace hazards that can be injurious to their health especially when exposure is on a regular and cumulative basis. The excessive high temperature generated by the hot oxyacetylene flame or the electric current may lead to burns and electric shocks. Injuries such as lacerations and cuts by sharp or pointed metal panes, from high velocity particles and occasional explosions of the oxyacetylene gas tanks may also occur (8). Hearing impairment may result from exposure to high noise level produced by the welding machine. There have been reports of carcinogenic and mutagenic effects due to chronic exposure to welding fumes in animals that may be extrapolated to man (9). Other organs, which may be affected by welding fumes, include the kidneys and the reproductive organs leading to reduction in sperm count and fecundity (10, 11).

1.2. Literature review

1.2.1. Welders knowledge towards occupational hazards

The awareness of occupational hazards and adherence of safety measures towards them are important factors in the prevention of these hazards among the welders. A study done in Nigeria showed that (77.9%) of the welders were aware of one or more workplace hazards (6). A study conducted in Benin showed that (91.6%) of the welders were aware of one or more workplace hazard while 96.4% had experienced one or more work-related health problem (7).

1.2.2. Safety measures

Eye injuries account for a substantial proportion of all work-related injuries (12). They are considered to be largely preventable, especially if adequate eye protection is used and appropriate machine guards are positioned over obvious hazards (13, 14). Welders also engage in high risk activities like cutting, filing, chiseling, and hammering further increasing the risk of occupational eye injuries resulting from flying particles, fragments, and sparks (15). A survey of eye safety practices among welders conducted in Lagos reported that less than half (43.7%) of the welders studied used welding goggles when welding. Another 45.4% used sun glasses, while others did not use any device, revealing that a large proportion of welders do not take adequate precautions to protect their eyes from hazards associated with welding(16). On a study conducted in Kaduna metropolis, Nigeria revealed that 60.9% used eye goggles and some of the reasons not for using protective devices were due to discomfort and poor visibility when using them (6).

A similar survey in a province in Thailand showed that all subjects used protective devices, with varying levels of correct use (17). But in a study conducted in the city of Benin, Nigeria, the average level of use of protective devices was generally low (35.9%) when compared to the work-related health complaints (96.4%). They used one or more types of protective device against work place hazards with eye goggles (35.9%), coveralls (31.2%) and hand gloves (20.8%)(7).

In a study conducted by Sithole H.L, Oduntan O.A and Oriowo M.O about eye protection practices and symptoms among welders in the Limpopo Province of South Africa 89% of the welders reported wearing protective devices always when welding but a few (11%) reported not always using them(18).

A research conducted in India with regard to knowledge attitude and practice of workers related to occupational health problems revealed that all workers had knowledge of protective measures to prevent occupational health problems but 29.5% of the respondents were using some type of unconventional types of protective measures to facilitate healing of injury. The reason for not using safety measures, 61.5% of workers were, non availability of device and safety devices not provided by the organization(19, 20).

1.2.3. Associated factors

In a study conducted on Kaduna metropolis, Nigeria It was found that awareness was positively influenced by educational attainment, increasing age, nature of training and work experience. Specifically, a higher proportion of older welders were aware of occupational hazards compared to their younger colleagues. Paradoxically, a higher proportion of welders trained through apprenticeship were aware of occupational hazards compared to those that attended formal welding schools. Expectedly, a higher proportion of experienced welders were aware of occupational hazards compared to their inexperienced counterparts (6).

A literature review on assessing occupational safety and health training suggested that reports were found and gave overwhelming evidence to show the merits of training in increasing worker knowledge of job hazards, and in effecting safer work practices and other positive actions in a wide array of worksites. A study conducted in Kingston, Ontario, Canada on gender occupational health and safety practices showed that the use of training and supervision during hazardous tasks has increased safety knowledge (22, 23).

A study conducted in Kingston, Ontario, Canada on gender, occupational health and safety practices showed that girls reported increased odds for the non-use of personal protective equipment (23). On the other hand a study conducted on knowledge, attitude and practice regarding organic solvents among printing workers in Hong Kong showed that safe practice did not depend on knowledge but was positively associated with being informed of safety precautions and being supplied chemical information by supervisors. Lack of adherence to personal protective equipments is probably due to individual factor (educational level, work experience) and the low level of education may have also contributed to the inadequate knowledge and the non-use of personal protective measures (24,25).

In a study by Isah E.C. and Okojie O.H.in Nigeria showed the levels of awareness of occupational hazards with the occurrence of health complaints were all statistically Significant. The most common complaints in this study were arc eye injuries (75.7%); foreign bodies in the eyes (70.0%); back/waist pain (52.1%); metal fume fever (43.8%) and cut/injuries to the hands and fingers (37.7%).(7)
In a study done in northern Nigeria by Sabitu K.et al., 85.3% of the welders had experienced one or more work-related accidents in the preceding year. The most common injuries sustained in this study were cut/injuries to the hands and fingers (38.0%), back/waist pain (19%), arc eye injuries/foreign bodies (17.0%), burns (14.0%), hearing impairment (7.0%), fractures (4.0%) and amputation (1.0%)(6).

In a study conducted on Awareness and utilization of protective eye device among welders in a southwestern Nigeria community found relationship between frequency of use of protective eye device and previous eye injury (26).
In a study conducted on factors associated with use of slip-resistant shoes in United States restaurants, it was found that weekly work hours and provision of slip-resistant shoes by the restaurant was significantly associated with the use of slip-resistant shoes on work (27).
A study in the United Arab Emirates reported education level and attending a training course about occupational health and safety was found to have a

significant influence on the workers knowledge about occupational hazards and on their use of personal protective equipments, but work experience hadn't significant association with the use of personal protective equipments (28).

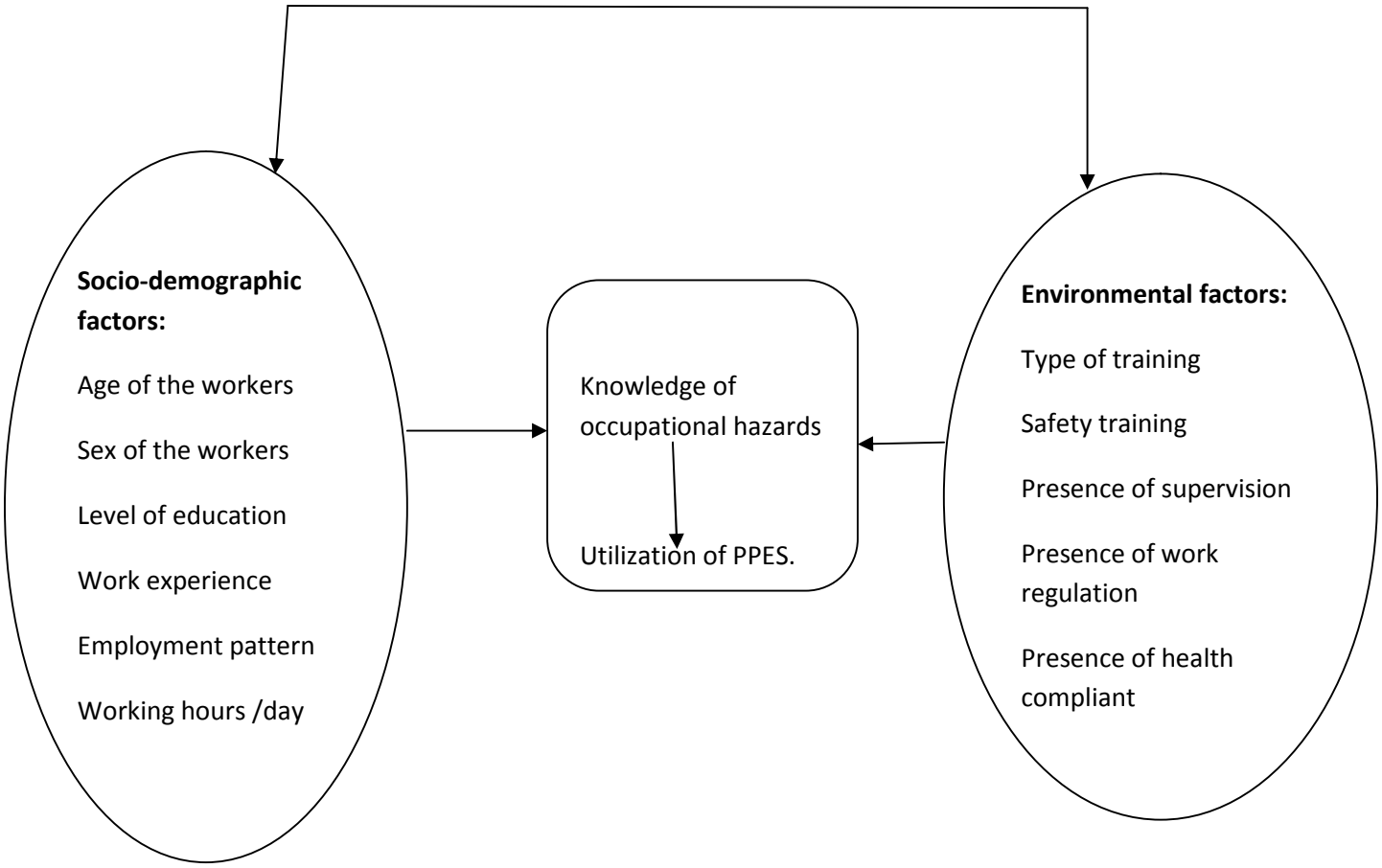

Figure.1. Conceptual framework of knowledge of occupational hazards and utilization of personal protective equipments

1.3. Justification of the study

The objective of occupational health and safety is to assure as much as possible that every working place has safe and healthy environment and promote worker's health, increase productivity and prevent accidents. Developing countries including Ethiopia have to do much to achieve this requirement. The main reason for this is lack of awareness of occupational hazards and not using or inappropriate practicing of health and safety measures among workers.

In Ethiopia industries are growing up, on the contrary studies regarding knowledge of occupational hazards and utilization of protective devices are limited. Therefore the result of this study will help planners and policy makers to design intervention and appropriate control methods in the work place and will serve as baseline for other researches.

2. OBJECTIVES

2.1 General Objective

- To assess the level of knowledge on occupational hazards, and utilization of personal protective equipment and associated factors among welders Gondar city, North West Ethiopia, 2012.

2.2 Specific objectives

- To determine the level of knowledge of occupational hazards among welders.
- To determine the level of utilization of personal protective equipments among welders.
- To identify factors associated with knowledge of occupational hazards.
- To identify factors associated with utilization of PPEs.

3. METHODS

3.1. Study design

A cross sectional study design was conducted.

3.2. Study area and period

The study was conducted in Gondar town from Aril15 to 30, 2012. Gondar town is found in north Gondar zone of Amhara regional state and is located 750 km North West of Addis Ababa. According to the 2007 Ethiopian census report, Gondar has a total population of 206, 987 and more than half (108,902) of them are females. Administratively the city is divided into 21 administrative areas.

There were around 121 garages and metal workshops in Gondar city which are disorganized and located along the road sides and the number of welders is around 500.

3.3. Source population

All welders in garages and metal workshops engaged in welding in Ethiopian.

3.4. Study population

The welders who were registered and who were in list of the small enterprises were considered as study population.

Exclusion criteria

Welders who cannot hear, seriously ill and unable to respond to the questions were excluded from the study.

3.5. Sample size and Sampling procedure

3.5.1. Sample size

Sample size was determined using a single proportion formula by using 43.7% utilization PPEs in Nigeria, 95% confidence interval and a maximum discrepancy of 5% between the sample and the underline population and 5% non response rate:

$$n = \frac{(Z_{\alpha/2})^2 * p(p-1)}{d^2}$$

Where n= sample size

Z=standard normal distribution curve value for the 95%

Confidence interval (1.96)

D= margin of error (5%)

$$n = \frac{(1.96)^2 * (0.437) * (1-0.563)}{(0.05)^2} = 378 + 19 = 397$$

3.5.2. Sampling procedure

The study subjects were selected by simple random sampling from the garages and metal welding workshops using lottery method.

3.7. Variables

3.7.1 Dependent variables

Knowledge on occupational hazards

Utilization of personal protective equipment

3.7.2 Independent variables

Socio-demographic variables**:** Age, sex, Educational status, marital status, Religion, Work experience, Employment pattern, hours of work per day, number of working days per week.

Environmental factors: presence of health complaint, Type of training, Safety training, Work regulation, presence of supervision, availability of PPEs in the organization.

3.8. Operational definitions

Knowledge on occupational hazards**-**: if respondents score for the knowledge questions of occupational hazards is: ≥mean value =knowledgeable, < Mean value = less knowledgeable

Personal protective equipments (PPE): any equipment or clothing which protects workers from hazards.

Utilization: wearing at least four of the PPEs while they are welding.

Presence of health complaint: if the respondents score for the health complain questions of occupational hazards: ≥mean value = compliant, < Mean value = less compliant.

Safety training: any training related to safety of working condition.

Work regulation: a document that guides the working conditions and precautions that should be taken.

Presence of supervision: supervision during working hours by safety officer, other health professional or experienced worker.

Type of training:

Welding school training: a formal training in schools which give welding Course.

Apprenticeship: Training obtained through informal practice with family or friend.

3.9. Data collection procedure

Pretested and structured questionnaire and observational check list was used to collect the required information. The questionnaire was first developed in English and then translated in to Amharic and back translated to English to check its consistency. Five percent of the questionnaires were tested and necessary adjustments were made prior to the actual study time. Four data collectors and two supervisors were participated to conduct the interview. A day to day supervision was made during the whole period of data collection. At the end of each day, the questionnaire was checked for completeness.

3.10. Data quality control

Pre test was conducted to check the accuracy and validity of the questionnaire prior to the actual study period. Training was given for data collectors and supervisors. The principal investigator and supervisors were conducting a day to day visit during study and supervised data collection. At the end of each day, the questionnaires were checked for completeness and submitted to the principal investigator.

3.11. Data processing and analysis

Data was entered, cleaned and edited using EPI INFO 2002 statistical soft ware and then exported to SPSS version 16 for analysis.

Descriptive statistics were done for most variables in the study using frequency tables, graphs, percentage, mean and standard deviation were used. Bivariate analysis was conducted primarily to check which variables have associated with the dependent variable individually. Variables found to have association with the dependent variable at 0.2 probability were then entered into multivariate logistic regression for controlling the possible effect of confounders and finally the variables which have significant association were identified on the basis of OR, with 95%CI and p-values less than or equal to 0.05 to fit into the final model.

4. ETHICAL CONSIDERATION

Ethical clearance for the proposed study was obtained from the Research ethics committee of University of Gondar and supporting letter was obtained from Gondar city administration. The purpose and importance of the study was explained to the participants. Data was collected after obtaining full informed verbal consent and confidentiality of the information maintained throughout by excluding names as identification in the questionnaire & keeping their privacy during the interview by interviewing them alone. Health education regarding welding hazards and their prevention measures and where to get services during injury times was given to the participants.

5. RESULTS

5.1. Socio-demographic characteristics

A sample of 390(98.2%) respondents was interviewed and giving a non response rate of 1.8% with main reason for non response being they were busy. Three hundred eighty seven (99.2%) were males. The mean age of respondents was 25.42 years with standard deviation of 7.37years .The majority, 240(61.5%) were in age group 20 to 29 years.

The dominant religion was orthodox Christianity, 82.6% and majority were Amhara (91%).Two hundred seventy (69.2%) of respondents were single with respect to marital status. Concerning education, 206 (52.6 %) were in grade 9-12 and 128 (32.8%) were grade 1-8.From the total respondents, 249 (63.8%) were permanent workers. About 224(57.4%) of the study subjects had less than 5 years of work experience followed by 69(17.7 %) above 5-9 years of experience in the enterprises (Table 1).

The majority, 324(83.1%) took apprenticeship training where as 66(16.9%) got training from schools which give welding courses. With respect working hours, 243(62.3%) had 8-10 working hours per day. Three hundred six (78.5%) of the participants had six or more days of work per week.

Table1.Socio-demographic characteristic of the respondents, Gondar city welders, June 2012, n=390.

Variable	Number	Percent
Age :		
<20 years	61	15.6
20-29 years	240	61.5
30-39 years	66	16.9
40 and above	23	5.9
Religion:		
Orthodox	323	82.8
Muslim	59	15.1
Protestant	8	2.1
Marital status:		
Single	270	69.2
Married	117	30
Divorced	3	0.8
Ethnicity:		
Amhara	355	91
Tigray	30	7.7
Oromo	3	0.8
Others	2	0.5
Educational status:		
Can't read and write	22	5.6
Primary school (1-8)	128	32.8
Secondary school(9-12)	206	52.8
Others	34	8.7
Type of training:		
Apprenticeship	324	83.1
Welding school	66	16.9
Employment pattern:		
Permanent	249	63.8
Temporary	141	36.2
Work hours per day:		
<5	47	12.1
5-7	51	13.1
8-10	243	62.3
>10	49	12.6
Experience duration:		
<5 years	224	57.4
5-9 years	69	17.7
10-14years	62	15.9
15 or above	35	9.0

5.2. Knowledge of study participants on occupational hazards

All respondents were aware of one or more welding occupational hazards. Majority, 258(66.2%), of respondents were knowledgeable of occupational hazards.

Among total respondents, 338(86.7%) had information of personal protective equipments and in 300(76.9%) of the respondents' organizations PPEs were available.

Majority, 372(95.4%) responded correctly to the question welding causes arc eye injury while only 90(23.1%) were correctly responded to the question welding can cause chronic cough.

Table 2: Knowledge level of respondents on occupational hazards, Gondar City welders, May 2012, n=390.

Knowledge questions	Number	Percent
Welding causes arc eye injury		
Yes	372	95.4
No	18	4.6
Welding causes foreign body enter into eye		
Yes	357	91.5
No	33	8.5
Welding doesn't cause breathlessness		
Yes	225	57.7
No	165	42.3
Welding can cause chronic cough		
Yes	90	23.1
No	300	76.9
Welding doesn't cause metallic fume fever		
Yes	231	59.2
No	159	40.8
Welding causes cut/injuries to the body		
Yes	306	78.5
No	84	21.5
Welding doesn't cause burns to the body		
Yes	212	54.4
No	178	45.6
Welding doesn't cause explosions		

Yes	257	65.9
No	133	34.1
Welding causes back pain		
Yes	167	42.8
No	223	57.2
Welding doesn’t cause hearing impairment		
Yes	179	45.9
No	211	54.1
Knowledge of occupational hazards		
Knowledgeable	258	66.2
Less knowledgeable	132	33.8

Among respondents who had information on welding occupational hazards 206(52%) got from their employer, 97 (24.9%) acquired from friend, 99 (25.4%) from their work experience) and 26 (6.7%) got from media (TV and radio).

Majority, 378(96.9%) of the welders had experienced one or more work related health complaint while 12(3.1%) didn’t experience any of the work related health hazards. The most common complaints were arc eye injury 338(86.7%), foreign body into the eyes (83.3%), cut/injury to the body 260(66.7%), burn to the body 230(59%).

Table3: level of health complaints among the respondents, Gondar city welders, June 2012, n=390.

Occupational hazard complaint	Number	Percent
Arc eye injury		
Yes	338	86.7
No	52	13.3
Foreign body enter into eye		
Yes	325	83.3
No	65	16.7
Breathlessness		
Yes	74	19
No	316	81
Chronic cough		
Yes	44	11.3
No	346	88.7
Metallic fume fever		
Yes	178	45.6
No	212	54.4
Cut/injuries to the body		
Yes	260	66.7
No	130	33.3
Burns to the body		
Yes	230	59
No	160	41
Explosions		
Yes	94	24.1
No	296	75.9
Back pain		
Yes	109	27.9
No	281	72.1
Hearing impairment		
Yes	31	7.9
No	359	92.1
Complain of occupational hazards		
Compliant	169	43.3
Less compliant	221	56.7

5.3. Utilization of PPE

Concerning utilization of PPE, 159(40.8%) welders utilized personal protective equipments. The mean of the number of personal protective equipment utilized by the respondents was 3.12 with the standard deviation of 1.48.

Table4: Number of PPE utilized by self reported respondents, Gondar city welders, June 2012, n=390.

Number PPE used	Frequency	Percent
0	13	3.3
1	39	10.0
2	87	22.3
3	92	23.6
4	93	23.8
5	48	12.3
6	11	2.8
7	7	1.8
Utilization of PPEs		
Utilize	159	40.8
Not utilize	231	59.2

Among respondents who used one or more personal protective equipments, goggle accounted the highest 373 (95.6%) followed by coverall 283 (72.6%) and the least 35 (9%) wore ear lug/muff (Figure 2).

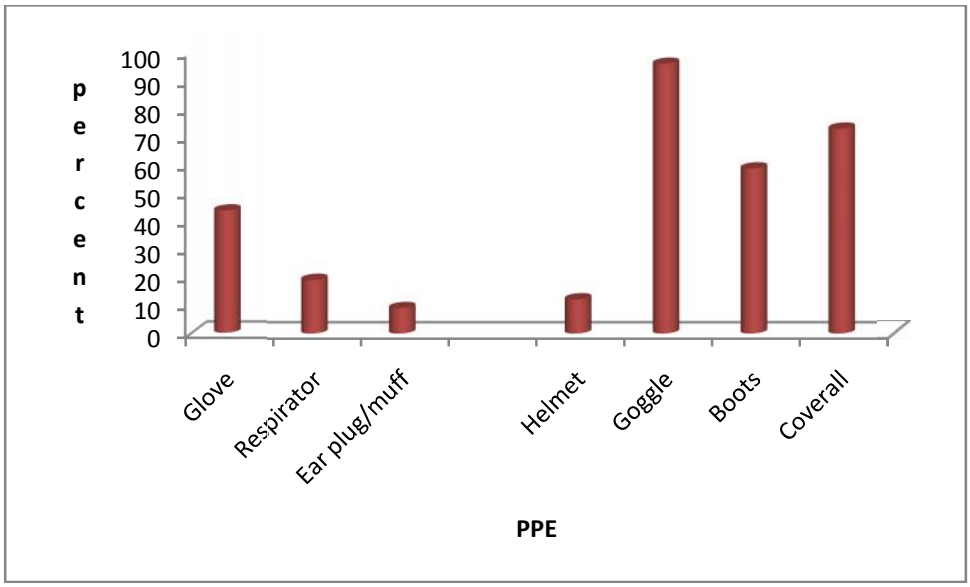

Figure .2. PPE (self reported) utilization of respondents, Gondar city welders, June 2012, n=390

By checklist, 67(17.2 **%)** welders utilized personal protective equipments. The mean number of personal protective equipments utilized by checklist by the respondents was 2.37 with the standard deviation of 1.34.

Table 5: Number PPEs utilized by respondents by checklist, Gondar city welders, June 2012, n =390

Number PPEs used	**Frequency**	**Percent**
0	39	10.00
1	56	14.40
2	109	27.90
3	121	31.00
4	47	12.10
5	13	3.30
6	1	0.30
7	4	1.00
Utilization of PPEs		
Utilize	67	17.2
Less utilize	323	82.8

Among the study respondents, 309 (79.2%) reported they had always used one or more PPE and the rest 68 (17.4%) used sometimes and 13(3.4%) never used at all. Among the study respondents, most of the respondents 367 (94.00%) used PPE because they knew the advantage for protecting eye injuries followed by observing others wearing 9(2.3 %) and 1 (0.3%) of them used because of other reasons like enforced to wear by the owner. Of these 13(3.4%) who didn't use PPEs, the reasons given for not using PPE were absence of PPEs by 5(1.3%), lack of knowledge about PPE by 2(0.5%), feeling uncomfortable during use by 5(1.3 %) workers and not affordable by 1(0.3%) respondent.

82(21 %) got safety training by different bodies on safety practice. Among those respondents who got training, 20(5.1%) were trained by safety personnel, 18(4.6%) were trained by health professionals, 22 (5.6%) were given by experienced worker (co-worker) and 22(5.6%) by owner.

303(77.7%) responded that they were supervised by different bodies. Among those who were supervised, 2 (0.5%) were by safety officer, 4 (1.0%) were by health professional, 268(68.7%) were by experienced worker and 29 (7.4%) by others (owner). 102 (26.2%) workers mentioned presences work regulation in their factory and 242(62.1%) workers mentioned presence of guidelines.

5.4. Factors associated with knowledge level of occupational hazards

During bivariate analysis age, educational status, type of training, working hours per day, number of working days per week, work experience, health complain, safety training, supervision, work regulation and availability of PPEs in the organization had significant association with knowledge level.

In multiple logistic regression variables such as work experience, type of training, safety training, working hours per day, supervision and health complain had significant association with the knowledge of welders. Welders who worked 8-10 hours per day were more than 3 times more likely to have knowledge of occupational hazards than welders who worked less than 5 hours per day [AOR: 3.73, 95% CI:1.60, 8.70]. Welders who had supervision were more than 2 times more likely to be knowledgeable than welders who hadn't supervision [AOR: 2.77, 95% CI: 1.52, 5.06]. And workers who got safety training were more than 2 times more likely to have knowledge than welders who hadn't safety training [AOR: 2.84, 95% CI: 1.30, 6.21].

Welders who had 10-14 years experience were 2.72 times more likely to be knowledgeable compared to welders who had less than five years experience [AOR:2.72, 95% CI:1.14, 6.49]. Welders had 15 years and above experience were 3.94 times more likely to be knowledgeable compared to welders who had less than five years experience[AOR:3.94, 95% CI:1.08, 14.29]. Welders who were compliant were 2.70 times more likely to be knowledgeable compared to welders who were less compliant [AOR: 2.70, 95% CI: 1.57, 4.64].

Table 6: Factors associated with knowledge of occupational hazards among Gondar city welders, June 2012, n=390.

Variables	Knowledge(>= mean score, and < mean score)			
	Yes n	No n	Crude OR(95% CI)	Adjusted OR(95% CI)
Work experience				
<5 years	129	95	1.00	1.00
5-9years	43	26	1.22(0.68,2.20)	0.80(0.42,1.52)
10-14 years	54	8	4.97(2.25,11.89)	2.72(1.14,6.49)
15 and above	32	3	7.86(2.21,33.20)	3.94(1.08,14.29)
Type of training				
Apprenticeship	219	105	1.00	1.00
Welding school	39	27	0.69(0.39,1.24)	0.51(0.26,1.001)
Working hours per day				
<5 hours	18	29	1.00	1.00
5-7 hours	24	27	1.43(0.59,3.47)	2.30(0.88,6.00)
8-10 hours	183	60	4.91(2.43,9.99)	3.73(1.60,8.70)
11 or above	33	16	3.32(1.33,8.42)	2.44(0.87,6.90)
Safety training				
Yes	72	10	4.72(2.26, 10.15)	2.84(1.30,6.21)
No	186	122	1.00	1.00
Supervision				
Yes	221	82	3.64 (2.16, 6.16)	2.77(1.52, 5.06)
No	37	50	1.00	1.00
Health complain				
Yes	138	31	3.75(2.28, 6.17)	2.70(1.57,4.64)
No	120	101	1.00	1.00

5.5. Factors associated with the Utilization of PPEs

During bivariate analysis age, educational status, type of training, working hours per day, number of working days per week, work experience, health complain, safety training, supervision and availability of PPEs in the organization had significant association with utilization of PPEs.

In multiple logistic regression variables such as work experience, safety training, working hours per day, health complain and availability of PPEs in the organization had significant association with utilization of PPEs.

Welders who worked 5-7 hours per day were 3.18 times more likely to utilize PPEs compared to welders who worked less than five hours per day [AOR:3.18,95% CI:1.02,9.89]. Welders who worked 8-10 hours per day were 2.95 times more likely to utilize PPEs compared to welders who worked less than five hours per day[AOR:2.95, 95% CI:1.12,7.75]. Welders who worked 11 hours and above per day were 4.82 times more likely to utilize PPEs compared to welders who worked less than five hours per day[AOR:4.82, 95% CI:1.58,14.71].

Welders had 10-14 years experience were 4.77 times more likely to utilize PPEs compared to welders who had less than five years experience [AOR:4.77, 95% CI:2.36, 9.64]. Welders who had 15 years and above experience were 2.98 times more likely to utilize PPEs compared to welders who had less than five years experience[AOR:2.98, 95% CI:1.28, 6.92].

Welders who had health compliant were 1.94 times more likely to utilize PPEs compared to welders who were less compliant [AOR: 1.94, 95% CI: 1.20, 3.13]. Welders who had safety training were 2.29 times more likely to utilize PPEs compared to those who had not training [AOR: 2.29, 95% CI:1.28, 4.11], and Welders who had PPEs available in their organization were 2.65 times more likely to utilize PPEs compared to those who had no PPEs available in their organization [AOR: 2.65, 95% CI: 1.38, 5.09].

Table 7: Factors associated with utilization of personal protective equipments among Gondar city welders, June 2012, n=390.

Variables	PPE utilization			
	Yes	No		
	n	n	Crude OR(95% CI)	Adjusted OR(95% CI)
Experience				
<5years	64	160	1.00	1.00
5-9years	25	44	1.42(0.77, 2.61)	1.03(0.55,1.90)
10-14years	47	15	7.83(3.92,15.84)	4.77(2.36,9.64)
15 and above	23	12	4.79(2.13,10.94)	2.98(1.28,6.92)
Working hours per day				
<5 hours	7	40	1.00	1.00
5-7 hours	15	36	2.38(0.79,7.34)	3.18(1.02,9.89)
8-10 hours	111	132	4.81(1.97,12.27)	2.95(1.12,7.75)
11 and above	26	23	6.46(2.22,19.50)	4.82(1.58,14.71)
Health complain				
Yes	94	75	3.01(1.94,4.68)	1.94(1.20,3.13)
No	65	156	1.00	1.00
Safety training				
Yes	54	28	3.73(2.17,6.44)	2.29(1.28,4.11)
No	105	203	1.00	1.00
Availability of PPEs in the organization				
Yes	143	157	4.21(2.27,7.91)	2.65(1.38,5.09)
No	16	74	1.00	1.00

6. DISCUSSION

Welding profession a means of livelihood for many Ethiopians, but like other professions it is not without risks. Knowledge of these hazards is the first step in avoiding them.

The mean score of respondents to the knowledge questions was 5.80. In this study the overall knowledge of respondents to occupational hazards was 66.2% which is different from the study conducted in Benin, Nigeria where 91.6% respondents knew one or more occupational hazards. This is due to difference in operational definition. In this study it was found that all of the welders were aware of one or more occupational hazards (7).

Majority, 372(95.4%) of the study subjects responded correctly to the question welding causes arc eye injury while only 90(23.1%) were correctly responded to the question welding can cause chronic cough and is similar with a study conducted in Benin, Nigeria(7)

In this study, 96.9% of the welders had experienced one or more work related health complaint and the most common complaints were arc eye injury 338(86.7%), foreign body into the eyes (83.3%), cut/injury to the body 260(66.7%), burn to the body 230(59%). This is similar with a study conducted in Benin, Nigeria where 96.4% of the welders had experienced one or more work related health problem and the most common problems were arc eye injury (75.7%), foreign body into the eyes (70%), cut/injury to the body 260(37.7%)(7). The high level of welding related health problems in the welders might be due to poor utilization of the personal protective equipments, the utilization of substandard personal protective equipments and inappropriate utilization of personal protective equipments.

In this study, 40.8% of study respondents self reported the utilization personal protective equipments, but by checklist only 17.2% of the respondents utilized personal protective

equipments and this discrepancy might be due to the welders might posses the personal protective equipments but not actually utilizing them. This is similar with a study conducted in Nigeria (7). This might be the similar infrastructure of the two nations. But in studies conducted in Thailand and South Africa higher level of utilization of personal protective equipments were reported(17, 18). This might be due to better economic and infrastructure of these countries relative to Ethiopia.
Despite good knowledge of the welders, the utilization of personal protective equipments was poor. This might be due to inaccessibility and unaffordable price of the personal protective equipments.

Among respondents who used personal protective equipments, goggle accounts the highest 373 (95.6%) followed by coverall 283 (72.6%) and the least 35 (9%) wore ear plug/muff and in a study conducted in Kaduna Metropolis, Nigeria the most widely used PPE was goggle(60.9%) and the least utilized PPE was ear plug/muff(10.3%) (6).

Of the thirteen respondents who didn't use personal protective equipments, the reasons given by respondents of not using PPE were absence of PPEs by 5(1.3%), lack of knowledge about PPE among 2(0.5%), feeling uncomfortable during use by 5(1.3 %) workers and not affordable by 1(0.3%) respondent. These reasons were similar with reasons given in studies conducted in Nigeria and India (6, 20).

Our study has revealed that safety training had significant association with knowledge level of respondents [AOR: 2.84, 95% CI: 1.30, 6.21]. Workers who got safety training were more than 2 times more likely to have knowledge than welders who hadn't safety training and a literature on assessing occupational safety and health training suggested that reports were found and gave overwhelming evidence to show the merits of training in increasing worker knowledge of job hazards, and in effecting safer work practices and other positive actions in a wide array of worksites (22). This is similar with study conducted in the United Arab Emirates on knowledge and practices to occupational hazards among cement workers that showed attending a training course about

occupational health and safety had significant association with knowledge of workers (28).

Work experience had significant association with the knowledge level of respondents. Welders who had 10-14 years experience were 2.72 times more likely to be knowledgeable compared to welders who had less than five years experience. Welders had 15 years and above experience were 3.94 times more likely to be knowledgeable compared to welders who had less than five years experience. This finding is consistent with the studies conducted in Kaduna, Nigeria and Abbottabad, Pakistan (6, 21). This might be due to the welders' exposure for health hazards increase as service year increases.

Supervision had significant association to knowledge level of welders. Welders who had supervision were more than 2 times more likely to be knowledgeable than welders who hadn't supervision. This is supported with the idea that direct safety instructions and supervisions at the work site would be more effective in ensuring increase knowledge and safe practice (23).

Working hours per day had significant association with knowledge of welders. Welders who worked 8-10 hours per day were more than 3 times more likely to have knowledge on occupational hazards than welders who worked less than 5 hours per day [AOR: 3.73, 95% CI:1.60, 8.70] and this might be as daily exposure time increases, the daily dose of the hazards also increases, but welders who worked 11 hours and above didn't have significant association with the knowledge of occupational hazards. Health complain was also significantly associated with knowledge [AOR: 2.70, 95% CI: 1.57, 4.64] and this finding is similar with study conducted in the south western Nigerian community (26). This is due to the fact that as welders get the welding hazard they know their job is hazardous.

Type of training was significant with the knowledge of welders on occupational hazards in a study conducted in Nigerian city, Kaduna (6). In this study it is marginal significant [P-value=0.050, AOR: 0.51, 95% CI: 0.26, 1.001]. This might be due to small sample

size. Education level didn't have significant association with knowledge of occupational hazards in contrary to the study conducted in Nigeria and this is against the fact that education easily assimilates instruction(6).

Experience had significant association with utilization of PPEs in contrary with the study conducted in United Arab Emirates (28). Welders who had 10-14 years experience were 4.77 times more likely to utilize PPEs compared to welders who had less than five years experience. Welders had 15 years and above experience were 2.98 times more likely to utilize PPEs compared to welders who had less than five years experience. This might be with experience welders have increased exposure duration to welding hazards and start to utilize PPEs.

Working hours per day had significant association with utilization of PPEs and this similar finding with study conducted in United States on factors associated with use of slip-resistant shoes in United States limited service restaurant (27). This might be as the working hours increases, the dose of exposure to the welding hazards also increase.

Our study has revealed that safety training had significant association with utilization of PPEs [AOR: 2.29, 95% CI: 1.28, 4.11]. And a literature on assessing occupational safety and health training suggested that reports were found and gave overwhelming evidence to show the merits of training in increasing worker knowledge of job hazards, and in effecting safer work practices and other positive actions in a wide array of worksites (22) and another study conducted in the United Arab Emirates on knowledge and practices to occupational hazards among cement workers showed attending a training course about occupational health and safety had significant association with the practice level of the workers(28).

This study revealed that health complain had significant association with utilization of PPEs [AOR: 1.94, 95% CI: 1.20, 3.13]. This finding is consistent with the study conducted in south western Nigeria community (26).

Availability of PPEs in the organization had significant association with utilization of PPEs [AOR: 2.65, 95% CI: 1.38, 5.09] and a study conducted in the United States of America regarding factors associated with use of slip-resistant shoes in US restaurants showed similar finding(27). Despite good knowledge of the welders, education didn't

have significant association with utilization of PPEs in contrary to the study conducted in United Arab Emirates (28) and this could be the welders might have poor attitude.

7. Strengths and limitations of the study

7.1. Strength of the study

1. Observational checklist and interview were used for data collection of utilization of PPEs

7.2. Limitations of the study

1. Recall bias might be in the health complain questions.
2. All components of occupational hazards were not assessed
3. Interviewer bias might occurred.

8. Conclusion

Almost two third of respondents were knowledgeable on the occupational hazards and Knowledge of welders towards occupational hazards was good.

There was a high level of welding related health problems among the welders and the most common health complain were arc eye injury, foreign body into the eyes, cut/injury to the body, body burn.

Increased work experience, long working hours per day, taking safety training, presence of supervision and presence of welding related health complain were the main source of knowledge of the welders.

The utilization of personal protective equipments among the welders was poor. Increased experience, long working hours per day, taking safety training, presence of welding related health complian and availability of personal protective equipment were the determinant variables for utilization of personal protective equipments.

9. Recommendations

Gondar town administration: has to arrange training and all the welders could get safety training in collaboration with the employers.

Welders: welders should utilize the available personal protective equipments appropriately during work hours.

Employers: - should increase Supervision of their employees

- and other stakeholders should work on availability, accessibility and utilization of personal protective equipment in relation to their work.

Ministry of health: The ministry of health in conjunction with ministry industry should collaborate to provide health care for this group of workers, as close as possible to where they live and work, in keeping with one of the principles of the primary health care programme.

Researchers: Further research should be done to assess knowledge of occupational hazards and utilization of personal protective equipments on the specific occupational hazards among the welders.

Future studies should examine whether the knowledge of occupational hazards is indeed insignificant with working hours per day.

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11. ANNEXES

Annex I: English version questionnaire

University of Gondar

College of Medicine and Health Science

Institute of Public Health

Questionnaire for assessment of knowledge of occupational hazards and utilization of personal protective equipment among welders in Gondar town.

Verbal consent form

Greeting

How are you, I am----------. I am working with Ato Dawit zenebe, who is doing a research on knowledge of occupational hazards and utilization of personal protective equipment among welders in Gondar tow**n** at University of Gondar. I would like to ask you few questions about occupational hazards and utilization of personal protective equipments. Your knowledge on them and your practices in your work will help to improve occupational health and safety and wok environment management provided to you based on your answers to these questions. Your name will not be written in this form and will never be used in connection with any information you tell us. All information given by you will be kept strictly confidential. Your participation is voluntary and you are not obligate to answer any question you do not wish to answer. IF you fill discomfort with the interview, please fill free to drop out any time you want. This interview will take about 30 minutes. Could I have your permission to continue?

1. Yes, 2. No,

Informed consent Certified by

Interviewer: Code----------Name----------signature----------

Date of interview----------Time started---------- Time completed-------

Result of interview: 1. Completed 2.Partially completed 3. Refused

Checked by:

Supervisor Name----------signature----------Date----------

Questionnaire identification number----------

Part I socio-demographic characteristics of respondents

No	Question	Possible response	Remark Code
101	Sex	1. Male 2. Female	
102	Age	In year ----------	
103	Religion	1. Orthodox 2. Muslim 3 Protestant 4. other	
104	Ethnicity	Amhara 2. Tigray 3. Oromo 4. Other	
105	Marital status	1. Married 2.Single 3. Divorced 4.others	
106	Educational status	1. Cannot read and write 2. 1-8 3. 9-12 4. others	
107	Type of training	1.Apprenticeship 2.welding school	
108	Employment pattern	1.Permanent 2.temporary	

109	Hours of work per day	**----------**
110	Work experience	In years---------
111	Number of working days per week	In days----------

Part II knowledge of occupational hazards

201	welding can cause arc eye injury.	1.Yes 2.No
202	welding can cause foreign body into the eye.	1.Yes 2.No
203	Welding cannot cause breathlessness.	1.Yes 2.No
204	welding can cause chronic cough.	1.Yes 2.No
205	welding cannot cause metallic fume fever.	1.Yes 2.No
206	welding can cause cuts/injuries to your body.	1.Yes 2.No
207	welding cannot cause burns to your body.	1.Yes 2.No
208	welding cannot cause explosion.	1.Yes 2.No
209	welding can cause back pain.	1.Yes 2.No
210	welding cannot cause hearing	1.Yes

	impairment.	2.No
211	What are your sources of knowledge to the occupational hazards?	1.Employer 2.Media 3.Experience 4.Peer 5.others

Part III occupation related Health complain towards occupational hazards during the last year

301	Did you have an arc eye problem last year?	1.Yes 2.No
302	Did a foreign body enter into your eye last year?	1.Yes 2.No
303	Did you face a difficulty of breathing last year?	1Yes 2.No
304	Did you have a chronic cough last year?	1.Yes 2.No
305	Did have a metallic fume fever last year?	1.Yes 2.No
306	Did you get a cut/injury to your body last year?	1.Yes 2.No
307	Did you have burns to your body last year?	1.Yes 2.No
308	Did an explosion happen last year while you were working?	1.Yes 2.No
309	Did you have a back pain last year?	1.Yes 2.No

310	Did you have a hearing impairment last year?	1.Yes 2.No	

Part IV utilization of personal protective equipments of respondents.

401	Have you had any safety training ?	1.yes 2.No	
402	If yes in Q401, who does give the training?	1. safety officer 2. other health professionals 3. Experienced worker 4. Others (specify)---------	
403	Do you have information of personal protective equipment ?	1.Yes 2.No	Whether he/she mention two of the PPEs
404	Are these PPEs available in your organization?	1.yes 2.No	
405	Do you use them?	1.Yes 2.No	
406	If yes for Q404 which one you use?	1. Gloves 2. Ear plug 3. Respirators 4. Helmets 5 Goggles. 6 Boots. 7. coveralls	You can choose more than one if you use
407	How often do you use them?	1.All the time 2.Occasionally 3.Not at all	
408	Reasons for using them	1 I know the advantage 2.By observing others wear 3.Other	

409	Reasons for not using them	1.Lack of protective equipment 2.Lack of knowledge 3.Decrease work performance 4.Not comfortable to use them 5.Not affordable
410	Do work regulations are present in your factory?	1.Yes 2.No
411	Are the work regulations well documented?	1. Yes 2. No
412	Do you have a guide line that help for your particular activities?	1.Yes 2.No
413	If yes for Q412 do you fellow that particular guide line?	1.Yes 2.No
414	Is an orientation given for a new employee?	1.Yes 2.No
415	Do you get supervision while you are working?	1.Yes 2.No
416	If for question 414 is yes, who give you the supervision?	1.health and safety professional 2. other health professional 3.exprienced worker 4.other (specify)

Annex II: Amharic version Questionnaire

በጎንደር ህክምናና ጤና ሳይንስ ኮሌጅ

የህብረተሰብ ጤና አጠባበቅ ት/ቤት

ይህ መጠይቅ በጎንደር ከተማ የሚገኙትን በብየዳ የተሰማሩ ሰዎች ስራቸው ልያመጣው በሚችለው ጉዳት ያላቸው ዕውቀትና የሚጠቀሙበት የሚለከላከያ መሳሪያዎች ለመለካት የተዘጋጀ ጥናት ነው::

መስያ

ቀበሌ ---------- የሚሰሩበት ድርጅት ------ የመጠይቅ መስያ ቁጥር ----------

ወደ ቃስ መጠይቁ ከመሄድ በፊት የተሳ ፈቃደኝነት መጠየቂያ ቅጽ

ሰላም :- ንደምን አሱ? ወ/ሮ ወ/ሪት ---------- ባላስሁ:: ከዚህ የመጣሁት ይህንን ጥናት የሚያካሂደው የጎንደር ዩነቨርሲቲ የህብረተሰብ ጤና አጠባበቅ ኢንስትቲዩት ቡድን አባል ሆኝ ነው:: ከዚህ በመቀጠል የብየዳ ሰራ ሲያመጣቸው በሚችለው የጤና ችግሮችን በተመለከተ ያለዎትና ስለ ሚጠቀሙት የመከላከያ መሳሪያዎች ያለዎትን አስተያየት በተመለከተ የተወሰኑ ጥያቂዎን ልጠይቅ ወዳለሁ:: ከርስዎ የሚገኘው መልስ የብየዳ ስራ ጤና አግልግሎትን ለማሻሻል ከፍተኛ ገዛ ይኖረዋል::

ከእርስዎ የምናገኘው ማንኛውም መልስ በሚስጥር እንጠብቃለን:: ከዚህ ጥናት ጋር በተያያዘ በማንኛ ውም ቦታና ጊዜ ስምዎን ንደማይመዘገብና ንደማይጠቀስም ልንገልጽልዎ ንወዳለን::

ስጥናቱ የምናሳትፈዎ የእርስዎ ሙሉ ፈቃደኝነት ስናገኝ ብቻ ነው:: በመጠይቁ ላለመሳተፍ ወይም በመጠይቁ ሂደት ሊመልሱት የማይፈልጉትን ጥያቄዎችን ያለመመለስ መብትዎ የተጠበቀ ነው::

በመጠይቁ ለመሳተፍ ፈቃደኛ ነዎት?

1. **አዎ ፈቃደኛ ነኝ ፊርማ ---------- መጠይቁ ይቀጥላል::**
2. **የለም ፈቃደኛ አይደለሁም ወደ ሌላ ተሳ ፊ መሸጋገር**

የመረጃ ሰብሳቢው ስም ---------- ፊርማ ----------

መጠይቁ የተሞላበት ቀን ----------የተቆጣጣሪው ስም ----------

መጠየቁ 1- የተሞላ 2) በከፊል የተሞላ 3) ያልተሞላ

ክፍል 1 ማህበራዊና ስነ - ህዘብ ገጽ ዎች

ትህዛዝ ከዚህ በታች የተዘረዘሩትን ጥያቄዎች መልስ ይሆናል ያሉትን ይክበቡ፡፡

ተ.ቁ	ጥያቄ	ምርጫዎች	ኮድ
101	ድሜ	በዓመት	
102	ፃታ	1.ወንድ 2.ሴት	
103	ሀይማኖት	1. ኦርቶዶክስ 2. ሙስሊም 3. ፕሮቴስታንት 4. ሌሎች --------	
104	ብሄር	1. አማራ 2. ትግራይ 3. ኦሮሞ 4. ሌላ	
105	የጋብቻ ሁኔታ	1. ያላገባ/ች 2. ያገባ/ች 3. የፈታ /ች 4. ሌላ ካለ ይጥቀሱ	
106	የትምህርት ደረጃ	1. ማንበብና መፀፍ የሚችል 2. 1-8ኛ ክፍል 3. 9-12ኛ ክፍል 4. ሌላ	
107	የወሰዱት የስልጠና ዓይነት	1. የመስክ ልምምድ 2. የብየዳ ትምህርት ቤት	
108	የቅጥር ሁኔታ	1. ቆሚ 2. ኮንትራት	
109	በቀን ስንት ስዓት ይሰራሉ	------	
110	በሳምንት ለስንት ቀን ይሰራሉ	---------	
111	በብየዳ ሙያ ለስንት ግዜ ቆይተዋል	በዓመት----------	

ክፍል -2 በስራዎ ምክንያት ሊያመጡ የሚችሉ ችግሮች በተመለከተ ያለወት እውቀት

201	ብየዳ ዓይን ውስጥ አሸዋ እንደገባ (የመቆርቆር) ዓይነት ስሜት ያመጣል፡፡	1. አዎ 2. የለም
202	ብየዳ በዕድ ነገር ያደረደ ዓይን እንዲገባ ያደርጋል፡፡	1. አዎ 2. የለም
203	ብየዳ የመተንፈስ ችግር አያመጣም ፡፡	1. አዎ 2. የለም
204	ብየዳ ረዥም ግዜ የሚቆይ ሳል ያመጣል፡፡	1. አዎ 2. የለም
205	ብየዳ ትኩሳት አያመጣም፡፡	1. አዎ 2. የለም
206	ብየዳ ገላዎን የመቆርጥ አደጋ ያመጣል፡፡	1. አዎ 2. የለም
207	ብየዳ ገላን የመቃጠል አደጋ አያመጣም፡፡	1. አዎ 2. የለም
208	ብየዳ የፈንዳታ አደጋ አያመጣም፡፡	1. አዎ 2. የለም
209	ብየዳ የጀርባ ህመም ያመጣል፡፡	1. አዎ 2. የለም
210	ብየዳ የመስማት ችሎታ አያቃውስም፡፡	1. አዎ 2. የለም
211	የዚህ ዕውቀት ምንጩ ከየት ነው?	1. ከቀጠረ 2. ከመገናኛ ብዙሐን 3. ከጓደኛ 4. ከልምድ 5. ሌላ ካለ ይጥቀሱ

ክፍል -3 በላፍው ዓመት ያጋጥመዎት የስራ ቦታ ችግሮች /አደጋዎች

301	ዓይንህ ውስጥ አሸዋ እንደ ገባ (የመቆርቆር) ስሜት አጋጥሞህ ነበር?	1. አዎ 2. የለም
302	ባዕድ ነገር ወደ ዓይን ውስጥ ገብቶ ነበር ።	1 አዎ 2. የለም
303	የመተፈንስ ችግር አጋጥሞህ ነበር?	1. አዎ 2. የለም
304	ለብዙ ግዜ የቆየ ሳል አጋጥሞህ ነበር?	1. አዎ 2. የለም
305	የብረት ጭስ ትኩሳትአጋጥሞህ ነበር?	1. አዎ 2. የለም
306	ገላህ የመቆረጥ አደጋ አጋጥሞህ ነበር?	1- አዎ 2- የለም
307	ሰውነትህን የመቃጠል አደጋ አጋጥሞህ ነበር?	1. አዎ 2. የለም
308	ስትሰራ የፍንዳታ አደጋ አጋጥሞህ ነበር?	1. አዎ 2. የለም
309	ስትሰራ የጀርባ ሕመም አጋጥሞህ ነበር ?	1.ኦዎ 2.የለም
310	የመስማት ችግር አጋጥሞህ ነበር ?	1.ኦዎ 2.የለም

ክፍል 4 የመከላከያ መሳሪያዎች አጠቃቀም በተመለከተ የቀረቡ ጥያቄዎች

401	የጤናና ደህንነት ስልጠና ወስደህ ታውቃለህ?	1. አዎ 2. የለም	
402	ለጥያቄ 401 መልስዎ አዎ ከሆነ ስልጠናው ማን ነበር የሰጠው?	1 የደንነት ኃላፊ 2. ሌላ የጤና ባለሙያ 3. ልምምድ ያለው ሰራተኛ 4. ሌላ ካለ ይግለፁ	
403	የግል መከላከያ መሳሪያ ምን እንደሆነ ያውቃሉ?	1. አዎ 2. የለም	2 መግለጽ ከ
404	መከላከያ መሳሪያ ትጠቀማለህ	1. አዎ 2. የለም	የለም ከሆነ ጥያቄ 408
405	መስራቤቱ የመከላከያ መሳርያ አለው ወይ	1.አዎ 2.የለም	
406	ለጥያቄ 404 አዎ ከሆነ መልሰዎ የተወኛው ነውየምትጠቀመው?	1. ጎንት 2. የትንፍሽ መከላከያ 3 ጆሮ ውስጥ የሚሰካ 4 የብረት ባርኔጣ 5 ቦቲ ጫማ 6 ጎግል መነፀር 7 ሁሉም ገላ የሚሸፍን	ከአንድ መምረጥ ይች
407	መቼ ነው የምትጠቀመው?	1.ሁልግዜ 2 አልፎ አልፎ 3 አልጠቀምም	
408	ለምን የመከላከያ መሰሪያ ትጠቀማለህ ?	1. ጥቅሙ ስለማውቀው 2. ሌሎች ሲጠቀሙ አይቼ 3. ሌላ ካለ ይግለፁ	
409	ለምንድን ነው የመከላኬ መሰሪያ የማትጠቀመው?	1 የመሳሪዎች እጥረት በገባያ 2 ዕውቀት ማነስ 3 የስራ ጥረት ስለሚቀንስ	

		4 ለአጠቃቀም ስለ ማይመቹ 5 ውድ ስለ ሆኑ
410	**ብየዳ ቤቱ የስራ ደንብ አለሁ ?**	**1.ኦዎ** 2.የለም
411	**ለጥያቄ ቁጥር** 410 *መልሰዎ* **አዎ ከሆነ ደንቡ የተጻፈ ነው ወይ**	1.አዎ 2.የለም
412	**ብየዳ ቤቱ የስራ** *መመሪያ* **አለሁ ?**	**1.ኦዎ** 2.የለም
413	**ለጥያቄ** 410 *መልሰዎ* **አዎ ከሆነ** *መመሪያው* **ይከተሉታል?**	**1.ኦዎ** 2.የለም
414	**ለአዲስ ቅጥረኛ የስራ ገለፃ ይደረግለታል?**	**1.ኦዎ** 2.የለም
415	**በስራ ግዜ የስራ ቁጥጥር እና ክትትል አለ ወይ**	1. አዎ 2. የለም
416	**ጥያቄ ቁጥር** 415 *መልስዎ* **አዎ ሆነ ቁጥጥር በማን ይኪያዳል**	1.በጤናና ደህንነት ባለሞያ 2.በሌላ ጤና ባለሞያ 3.በልምድ ባለው ሰራተኛ 4.ሌላ ካለ ይግለጹ

ANNEX III: Observational Checklist for utilization of personal protective equipments

No	Type of personal protective equipment in use	Yes	No	Remark
1	Gloves			
2	Ear plug/ ear muff			
3	Respirators			
4	Helmets			
5	Goggles			
6	Boots			
7	Coveralls			

Annex IV: Information Sheet and Consent Form

Information Sheet and Consent Form Prepared for workers who are going to participate in this Research Project, Assessment of Knowledge occupational hazards and utilization of personal protective equipments among welders in Gondar town, North Gondar zone, Amhara regional state, North Ethiopia

Name of Principal investigator: Dawit zenebe
Name of the organization: university of Gondar, college of Medicine And Health
Sciences, Institute of Public Health

Name of the Sponsor: University of Gondar

Introduction: This information sheet and consent form is prepared to explain the study you are being asked to join. Please listen carefully and ask any questions about the study before you agree to join. You may ask questions at any time after joining the study.

Purpose of Research Project: The purpose of this research is to assess knowledge of occupational hazards and utilization of personal protective devices among welders in Gondar town. The study will be helpful in determining the current level of knowledge and safe practices of workers and contribute much to design appropriate intervention strategies. It also will serve as a springboard for subsequent studies in the country.

Procedure: To assess knowledge of occupational hazards and utilization of personal protective equipments. We invite you to take part in this project. If you are willing to participate in this project, you need to understand and sign the agreement form. Then after, you will be interviewed by the data collector to give

your response. All your responses and the results obtained will be kept confidentially by using coding system whereby no one will have access to your response.

Risk/ Discomfort: By participating in this research project, you may feel that it has some discomfort especially on wasting time about 30 minutes. We hope you will participate in the study for the sake of the benefit of the research result. There is no risk in participating in this research project.

Benefits: If you participate in this research project, there may not be direct benefit to you but your participation is likely to help us in assessing the knowledge occupational hazards and utilization of personal protective equipments. Ultimately, this will help us to work on awareness creation and safe practices interventions.

Incentives: You will not be provided any incentives or payment to take part in this project.

Confidentiality: The information collected from this research project will be kept confidential and information about you that will be collected by this study will be stored in a file, without your name, but a code number assigned to it. And it will not be revealed to anyone except the principal investigator and will be kept locked with key.

Right to refuse or withdraw: You have full right to refuse from participating in this research. You can choose not to respond to some or all questions if you do not want to give your response. You have also the full right to withdraw from this study at any time you wish, without losing any of your right.

Person to contact:

1. Mr. Dawit zenebe Tel: +251-920-25-55-31: Email:dawitzemichael12@gmail.com
2. Mr. Walelign Worku Tel:+251-918-09-9496; Email:walelignw@yahoo.com

3. Mr. Teresa Kisi Tel:+251-911-00-7476; Email:terk7@gmail.com

ANNEX V: Amharic version information sheet and consent form

የመረጃ መስጫ እና ስምምነት መጠየቂያ ቅጽ

በጎንደር ከተማ የሚገኙ በያጆች ስራቸው ሊያመጥባቸው በሚችል ችግሮች በተመለከተ ያላቸው ዕውቀትና ስለሚጠቀሙት የመከላከያ መሳሪያዎች እና ተያያዥ ጉዳዮች ለማወቅ ለማድርግ ጥናት የመረጃ መስጫና ስምነት መግለጫ የተዘጋጀ ቅጽ

ዋና ተመራማሪ ፡- ዳዊት ዘነበ

የተቋሙ ስም ፡- ጎንደር ዩኒቨርስቲ ህክምናና ጤና ሳይንስ ኮሌጅ የህብረተሰብ ጤና አጠባበቅ ኢንስትቲዩት

ወጭውን የሚሸፍነው ተቋም፡- ጎንደር ዩኒቨርስቲ

<u>መግቢያ</u>

ይህ የማብራሪያና የስምምነት ቅጽ አሁን እርስዎ እንዲሳተፉበት የምንጠይቅዎትን የምርምር ጥናት የሚያብራራ ነው፡፡ እባክዎ በዚህ ጥናት ለመሳተፍ ከመወሰንዎ በፊት ይህንን ቅጽ መረጃ ሰብሳቢዎቹ በሚያነቡልዎት ጊዜ በጥንቃቄ በማድመጥ ጥያቄዎች ካልዎት ይጠይቁ፡፡ በዚህ ጥናት መሳተፍ ከጀመሩ በኋላ በማንኛውም ጊዜ ጥያቄዎችን ካልዎት መጠየቅ ይችላሉ፡፡ ጥናቱ የሚያካሂደው በአንድ የሕብረተሰብ ጤና አጠባበቅ ትመህርት ተመራቂ እና በሁለት የጎንደር ዩንቨርሲቲ የጥናትቱ አማካሪዎች ነው፡፡

<u>የጥናቱ ዓላማ፡-</u> የዚህ ጥናት ዓላማ በጎንደር ከተማ የሚኖሩ በያጆች ስራቸው ሊያመጠባቸው በሚችል ችግሮች በተመለከተ ያላቸው ዕውቀትና ስለሚጠቀሙት የመከላከያ መሳሪያዎች እና ተያያዥ ጉዳዩች ለማወቅ ነው፡፡ ይህ ጥናት የመፍትሔ ስልቶችን ለመቀየስ ይረዳል፡፡

<u>የአሰራር ሂደት</u>

በዚህ በጎንደር ከተማ የሚኖሩ በያጆች ሰራቸው ሊያመጥባቸው በሚችል ችግሮች በተመለከተ ያላቸው ዕውቀትና ስለሚጠቀሙት የመከላከያ መሰሪያዎች እና ተያያዥ ጉዳዩች ለማወቅ በሚካሄደው ጥናት እርስዎም እንዲሳተፉ ጋብዘነዎታል። በዚህ ጥናት ውስጥ ለመሳተፍ ከተስማሙ ስምምነቱን መረዳትና መስማማትዎን መግለጽ ይኖርበታል። ከዚህ በኋላ መረጃ ሰብሳቢው መጠይቁ ላይ ያሉትን ጥያቄዎችን ይጠይቅዎታል። የሚሰጡት መረጃ ሚስጥራዊነቱ ይጠበቃል።

<u>አደጋዎች ወይም አለመመቻቸት ፡-</u>

በዚህ ጥናት በመሳተፍዎ የተወሰነ ያለመመቻቸት ሊሰማዎት ይችላል። በተለይ የስራ ጊዜዎትን ለ30 ደቂቃ ያህል ይሻማዎታል። ነገር ግን ጥናቱ ከሚሰጠው ጥቅም አኳያ እንደሚሳታፉ ተስፋ አደርጋለሁ።

<u>ጠቀሜታ</u>

በዚህ ጥናት ላይ በመሳተፍ ቀጥተኛ የሆነ ጥቅም ላያገኙ ይችላሉ። ነገር ግን እርስዎ በተመለከተው ዓላማና ይዘት መሰተፋዎ የበያጆት ግንዛቤ ለመጨመር ለሚለደረገው ጥረት ትልቅ ድርሻ ሊኖረው ይችላል።

<u>የተሳትፎ ክፍያዎች፡-</u>

በጥናቱ በመካፈልዎ የሚሰጥ ክፍያ የለም።

<u>ሚስጥር ስለመጠበቅ፤</u>

ለዚህ ጥናት የሚሰበሰብ መረጃ በሚስጥር ይጠበቃል። የሚሰበሰበው መጠይቅ በዋናው ተመራማሪ ብቻ ጥቅም ላይ ይውላል። መረጀው በዋና ተመራማሪው ፋይል ተደርጎ በቁልፍ የሚቀመጥ በመሆኑ ሌላ ሰው ሊያገኘው አይችልም።

<u>በጥናቱ ያለመሳተፍ ወይም ራስን ከጥናቱ የማግለል መብት፡</u>

በጥናቱ ላለመሳተፍ ከፈለጉ በዚህ ጥናት ያለመሳተፍ ሙሉ መብት አለዎት፡፡ ከመጠይቁ ውስጥ ጥቂት ጥያቄዎችን ወይም በሙሉ ያለመመለስ ይችላሉ፡፡

<u>የሚያገኝዋቸው ሰዎች፡</u>

ለዚህ ጥናት ማነጋገር ከፈለጉ ከሚከተሉት የፈለጉትን ማነጋገር ይችላሉ፡፡

1. አቶ ዳዊት ዘነበ

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